

L3(5.3) - Transformations & Graphing from Vertex Form

vertex form:

$$y = \pm a(x - h)^2 + k$$

+, parabola opens up
-, parabola opens down

- if $a > 1$, vertical stretch
- if $0 < a < 1$, vertical compression

• h is the x -coordinate of the vertex
• will result in a horizontal shift (left or right).

• k is the y -coordinate of the vertex
• will result in a vertical shift (up or down)

Mar 20 - 4:17 PM

To graph, choose a strategy:

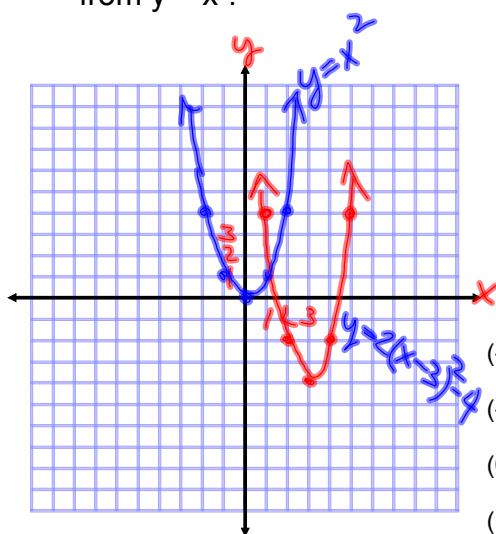
1. Table of Values
 - starting method for any graph
 - try to choose x -values around axis of symmetry
 - calculate y -values and plot points
2. Transformations
 - determine transformations in correct order
 - apply transformations to key points from $y = x^2$
3. Vertex & Step Pattern
 - determine location of vertex
 - determine step pattern compared to $y = x^2$
 - note direction of opening (vertical reflection?)
 - build parabola starting at vertex

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Ex.1 Graph $y = 2(x - 3)^2 - 4$
by transforming points
from $y = x^2$.

$$y = x^2$$

x	y
-2	4
-1	1
0	0
1	1
2	4



- 1) V.Stretch by a factor of 2 -- effects (y)
- 2) H.Shift right by 3 ----- effects (x)
- 3) V.Shift down by 4 ----- effects (y)

$$(-2, 4) \xrightarrow{y \times 2} (-2, 8) \xrightarrow{x + 3} (1, 8) \xrightarrow{y - 4} (1, 4)$$

$$(-1, 1) \longrightarrow (-1, 2) \longrightarrow (2, 2) \longrightarrow (2, -2)$$

$$(0, 0) \longrightarrow (0, 0) \longrightarrow (3, 0) \longrightarrow (3, -4)$$

$$(1, 1) \longrightarrow (1, 2) \longrightarrow (4, 2) \longrightarrow (4, -2)$$

$$(2, 4) \longrightarrow (2, 8) \longrightarrow (5, 8) \longrightarrow (5, 4)$$

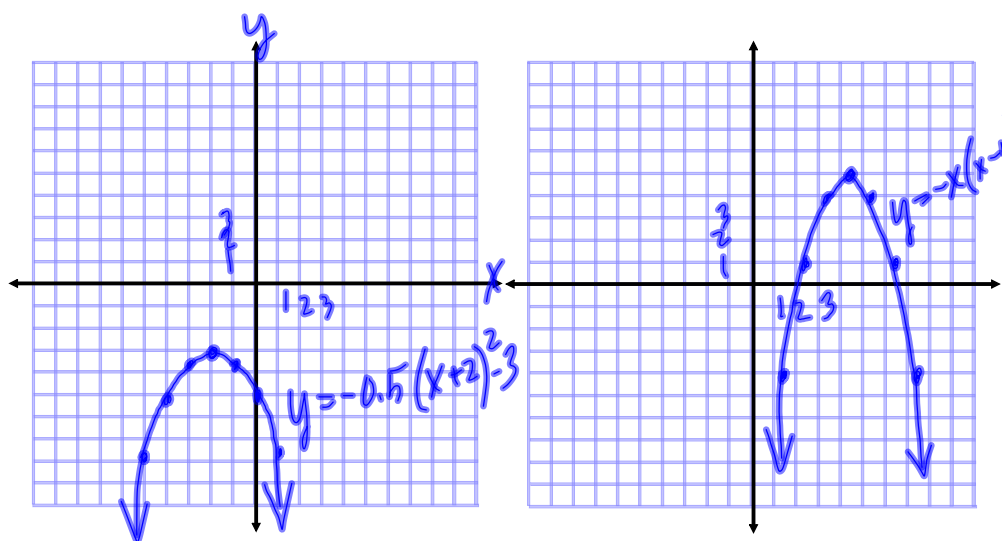
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Ex.2 Graph $y = -0.5(x + 2)^2 - 3$
using the vertex and
step pattern.

State the vertex and the step
pattern, then graph.

$$(a) y = -(x - 4)^2 + 5$$

Vertex $(-2, -3)$ Step $-0.5, -1.5, -2.5$ Vertex $(4, 5)$ Step $-1, -3, -5$

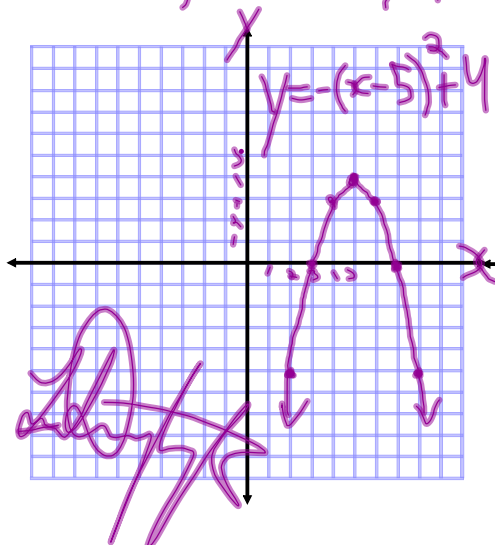


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State the vertex and the step pattern, then graph.

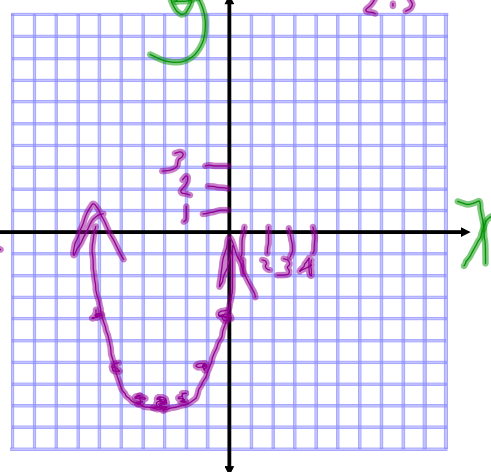
(a) $y = -(x - 5)^2 + 4$

Vertex $(5, 4)$ Step $-1, -3, -5$



(b) $y = 0.5(x + 3)^2 - 8$

Vertex $(-3, -8)$ Step $0.5, 1.5, 2.5$

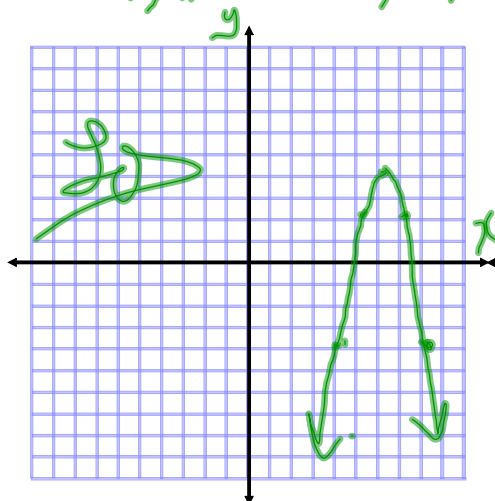


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State the vertex and the step pattern, then graph.

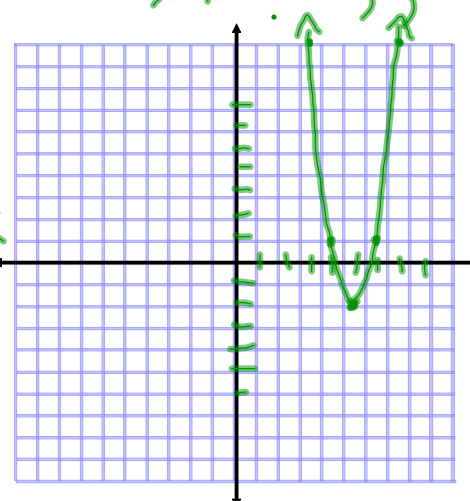
(c) $y = -2(x - 6)^2 + 4$

Vertex $(6, 4)$ Step $-2, -6, -10$



(d) $y = 3(x + 5)^2 - 2$

Vertex $(-5, -2)$ Step $3, 9, 15$



Assigned Work: p.269 #1 - 3 (basics), 4odd, 5odd, 6, 7odd, 11, 13, 14, 15, *10

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